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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,474	09/01/2006	Itaru Kanno	33082M341	1445

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EXAMINER	
OSTERHOUT, BENJAMIN LEE	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
03/01/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/591,474	KANNO ET AL.	
	Examiner	Art Unit	
	BENJAMIN OSTERHOUT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20090917*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 17 September 2009 was filed after the mailing date of the Non-final Office Action on 17 July 2009. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 20030079764 to Hirose et al. (Hirose) in view of Japanese Patent Application Publication No. JP 2001252604 to Tateyama.

Regarding claim 1, Hirose teaches a substrate processing apparatus for cleaning a semiconductor (paragraph 2, ll. 1-3) wherein a two fluid nozzle (Fig. 7, generally, paragraph 47, ll. 1-2) mixes a gas and liquid comprising: a nitrogen gas supply passage (Fig. 7, part 28), a liquid passage for supplying deionized water (Fig. 7, part 27), and an ejection passage formed in a straight shape (lead-out passage, Fig. 7, part 45a) to eject a mixture fluid (paragraph 78, ll. 7-13); wherein the ejection passage has an opening (port) is formed at the front end of the ejection passage (Fig. 7, near parts 45 and 45a); wherein the cross-sectional area of the ejection of the exit of the nitrogen gas supply passage is smaller than the cross-sectional area of the ejection passage (Fig. 7, near converging arrows and 45a). Hirose teaches an ejection port with a cross-sectional area equal to the ejection passage. Hirose does not teach that the cross-sectional area of the ejection port is smaller than a cross-sectional area of the ejection passage and that the cross-sectional area of said ejection passage (injection port) is formed constant from an entrance thereof to an exit thereof.

Tateyama teaches a substrate processing apparatus (paragraph 1, ll. 1-3) wherein the nozzle (Fig. 5, part 60) has a discharge opening (Fig. 5, part 63) that has a cross-sectional area smaller than a cross section area of the passage leading up to the opening (Fig. 5, parts 60 and 63) in order to apply liquid cleaning solution and clean the substrate (paragraph 1, ll. 1-3).

Since Hirose and Tateyama both teach substrate processing apparatuses with liquid nozzles, it would have been obvious to substitute the nozzle of Hirose with the nozzle of Tateyama with an opening that has a smaller cross-sectional area than the

passage leading up to the opening in order to achieve the predictable result of applying cleaning liquid to a substrate and cleaning said substrate.

Hirose in view of Tateyama does not teach that the cross-sectional area of said ejection passage (injection port) is formed constant from an entrance thereof to an exit thereof.

However, this is merely a change in shape wherein the configuration of the claimed injection port was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed injection port was significant in order to achieve the predictable result of delivering a cleaning liquid onto a wafer to be cleaned. See MPEP 2144.04 IV, B. See also *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding claim 2, Hirsose in view of Tateyama is relied upon as above in claim 1. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the ejection passage to the ejection port is 1: 0.25 to 0.81, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 2, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 3, Hirose in view of Tateyama is relied upon as above in claim 1. Hirose teaches that the cross-sectional area of the nitrogen gas supply passage is smaller than the cross-sectional area of the ejection port (Fig. 7, parts 28 and near 45a).

Regarding claim 4, Hirsose in view of Tateyama is relied upon as above in claim 3. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the ejection port to the nitrogen gas supply passage is 1: 0.16 to 0.87, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 4, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 5, Hirsose in view of Tateyama is relied upon as above in claim 4. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the nitrogen gas supply passage is 1.13 mm^2 to 6.16 mm^2, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 5, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 6, Hirsose in view of Tateyama is relied upon as above in claim 4. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the nitrogen gas supply passage is 1.77 mm^2 to 4.91 mm^2, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 6, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 7, Hirsose in view of Tateyama is relied upon as above in claim 1. Hirose teaches that the ejection passage is formed in a straight shape and that the cross-sectional area of the ejection passage is constant (Fig. 7, part 45a).

Regarding claim 8, Hirsose in view of Tateyama is relied upon as above in claim 7. While discloses the claimed invention except for a length of the ejection passage is 10 mm to 90 mm, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 8, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 9, Hirsose in view of Tateyama is relied upon as above in claim 1. While Hirsose in view of Tateyama disclosed the claimed invention except for a length of the ejection port being 30 mm or shorter it would have been obvious to one skilled in the art at the time of invention to use the 30 mm or shorter ejection port, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (see MPEP 2144.05, Section II, Part B).

Regarding claim 10, Hirsose in view of Tateyama is relied upon as above in claim 1. Hirose teaches that a buffer chamber (liquid introduction passage, Fig. 7, part 44a) has an annular shape and surrounds the nitrogen gas supply passage (Fig. 7, part 28) wherein the nitrogen gas supply passage is coaxial with the ejection passage (Fig. 7, parts 28 and 45a); the liquid supply (Fig. 7, part 27) is opened on an outer peripheral face of the buffer chamber (Fig. 7, parts 27 and 44a); a taper portion is formed with a diameter which gets smaller toward a front end side in said buffer chamber (Fig. 7, part

44a near where arrows converge); the taper portion opens between the nitrogen gas supply passage and the ejection passage (Fig. 7, where arrows converge); and the gas and liquid mix together wherein one of ordinary skill realizes that cleaning solution droplets will be formed.

Regarding claim 11, Hirsose in view of Tateyama is relied upon as above in claim 1. One of ordinary skill in the art realizes that the substitution made in claim 1 and the nozzle of Tateyama will form a vertical cross-sectional shape of an exit side periphery having an acute angle.

Regarding claim 12, Hirsose in view of Tateyama is relied upon as above in claim 1. Hirose teaches a spin chuck (Fig. 4, part 71) for holding a substrate horizontal; and a drive mechanism for moving the nozzle comprising a holding arm and guide rail (Fig. 4, parts 77 and 34, respectively).

Examiner's Response to Arguments

Examiner has carefully and fully considered Applicants' amendments and arguments in support of patentability, however, Examiner remains unconvinced. Applicants' argue that nowhere does Hirose teach or suggest that the ejection passage is formed in a straight shape, that the cross-sectional area of the injection port is smaller than the cross-sectional area of the ejection passage, that the joint portion between the ejection passage and the injection port is formed in a stepped shape.

Examiner strongly disagrees with Applicants'. Hirose teaches that ejection passage is formed in a straight shape (Fig. 7, part 45a) and that the cross-sectional

area of the injection port is smaller than the cross-sectional area of the ejection passage (Fig. 7, see near arrows and part 45a). With regards to the joint portion between the ejection passage and the injection port formed in a stepped shape, Applicants' do not specifically claim the stepped shape and therefore Examiner considers this argument moot.

With regards to the amendment adding that the injection port is formed constant from an entrance thereof to an exit thereof, Examiner has addressed this above in claim 1.

Finally, Applicants' argue that Tateyama does not cure the deficiencies of Hirose. However, Examiner has argued that Hirose does not have the deficiencies as argued by Applicants', therefore this argument is moot.

It is also noted that Applicants' have stated the secondary consideration that the constant shape of the injection port allows for the atomization of the liquid drops and that as the number of drops increases such that a large number of fine particle drops can be injected at a favorable injection speed to the wafer thereby better cleaning said wafer. However, Examiner takes specific issue with the contribution (secondary consideration) over the prior art that Applicants' have argued. Specifically, Examiner finds that increasing the number of drops coupled with increased atomization/fineness of the liquid drops in order to increase cleaning efficiency would have been realized by one of ordinary skill in the art. Rather Examiner finds that Applicants', through Examiner's review of the specification, have merely increased the efficiency of an apparatus with several known components/features through a routine experimentation

(see Specification, pages 3, 4, 14-21, 28, and 31-33) that has optimized the ranges of the apparatus which would have been obvious to one of ordinary skill in the art at the time of the invention. Applicants' are encouraged to explain to Examiner in detail why Examiner may have erred in finding the above and then state further the contributions of the current invention over the prior art.

Therefore claims 1-12 stand rejected.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN OSTERHOUT whose telephone number is

(571)270-7379. The examiner can normally be reached on Monday-Thursday 8:30am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Barr can be reached on (571)272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph L. Perrin/
Joseph L. Perrin, Ph.D.
Primary Examiner
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/BLO/

Benjamin L. Osterhout
19 February 2010